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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

David R. Battiste

Serial No.: 09/705,316

Filed: November 3, 2000

For: IMPROVED MONITORING AND
CONTROL OF PROCESSES FOR
MAKING 1-HEXENE

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Group Art Unit: 1764

Examiner: Buttner, David J.

Atty. Docket: CPCM:0008/FLE
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August 14, 2006

Date

Marcie Alsbury
Marcie Alsbury

Sir:

REPLY BRIEF PURSUANT TO 37 C.F.R. § 41.41

This Reply Brief is being filed in response to the Examiner's Answer mailed on June 13, 2006. This Reply Brief addresses the Examiner's misunderstanding of the technology at issue, as well as the Examiner's continuing pattern of stretching the teachings of the prior art beyond their reasonable limits in order to reach the subject matter taught and claimed by Appellant.

Claim Rejections under 35 U.S.C. § 103(a)

In the Final Office Action, the Examiner rejected the present independent claims (claims 1 and 30) under 35 U.S.C. § 103(a) as obvious over Lashier et al. (U.S. Patent No. 5,689,028) in view of Alsmeyer et al. (U.S. Patent No. 5,638,172). Independent claim 1 recites “monitoring an *olefin oligomerization* reaction by using low-resolution Raman spectrometry equipment.” (Emphasis added). Independent claim 30 recites “monitoring a *trimerization reaction* by using Raman spectrometry equipment, wherein the Raman spectrometry equipment comprises low resolution Raman spectrometry equipment; and recovering *1-hexene* from the trimerization reaction.” (Emphasis added).

Low-Resolution Raman Not Disclosed in the Cited Combination

In formulating the rejection, the Examiner stated that it would have been obvious to use the “appropriate wave lengths” to monitor the Lashier process. *See* Final Office Action, page 4. However, the Examiner misses the point. The Examiner has not shown that the Alsmeyer device falls within the category of a low-resolution device. Therefore, the Examiner has *not* met his burden in demonstrating that the cited combination includes all of the claimed elements. Accordingly, the Examiner has failed to establish a *prima facie* case of obviousness with regard to independent claims 1 and 30, and their dependent claims.

A given Raman device possesses a certain resolution capability, placing that device in either the category of a low resolution device or a high resolution device.

While the numerical demarcation (about 8 cm^{-1}) between low-resolution Raman and high-resolution Raman may vary slightly, those of ordinary skill in the art readily classify a Raman spectrometer as either low-resolution or high-resolution. *See, e.g.*, http://www.avaloninst.com/content/raman_information/glossary.htm (stating that for Raman spectroscopy, “larger than 8 cm^{-1} is considered low resolution”) (last accessed, July 6, 2006); <http://www.enwaveopt.com/doc/SpectroscopyArticle.pdf> (explaining on page 32, column 2, that high-resolution Raman is a resolution smaller than 6 cm^{-1}) (last accessed, July 6, 2006); Application, page 9, lines 23-24 (disclosing that a Raman device having a resolution capability of 15 cm^{-1} , or higher, falls in the category of a low resolution device).

Appellant believes that the Alsmeyer Raman device is a high-resolution device, falling outside of the low-resolution category, as claimed. However, it is not Appellant's burden to demonstrate the resolution of the Alsmeyer device. Instead, Appellant emphasizes that it is the Examiner's burden to show that the Alsmeyer device is a low-resolution device, as claimed. *See Ex parte Wolters and Kuypers*, 214 U.S.P.Q. 735 (PTO Bd. App. 1979) (directing that the burden of establishing a *prima facie* case of obviousness falls on the Examiner); *Ex parte Clapp*, 227 U.S.P.Q. 972 (B.P.A.I. 1985) (explaining that to establish a *prima facie* case of obviousness, the Examiner must show that the cited combination includes *all* of the claimed elements). Again, the Examiner has failed to meet this burden, and therefore, has not established a *prima facie* case of obviousness.

No Reason to Modify Lashier as Suggested by the Examiner

Not only has the Examiner failed to show that the Alsmeyer reference discloses a *low-resolution* instrument, as claimed, the Examiner has not shown or explained how the cited references teach the applicability or suggest the use of a low-resolution Raman device in the Lashier process (or in the claimed processes). Even if Alsmeyer taught a *low-resolution* Raman device (which the Appellant does not concede), there is no motivation to modify the Lashier 1-hexene process to incorporate a *low-resolution* device to monitor the conversion of ethylene to 1-hexene. *See, e.g.*, Final Office Action, page 4. Indeed, one of ordinary skill in the art, without the benefit of the present disclosure, would not know to employ a Raman device (especially a *low-resolution* Raman) in the 1-hexene process of Lashier, much less appreciate the feasibility of such an application.

This is especially clear in light of the closeness of the spectral peaks of the ethylene monomer and the 1-hexene product. The skilled artisan, without the benefit of the Appellant's disclosure, would dismiss *low-resolution* Raman spectrometry because the peaks of ethylene (1620 cm^{-1}) and 1-hexene (1640 cm^{-1}) are so close. *See, e.g.*, Application, page 4, lines 11-13 ("Thus, it would appear necessary to employ high resolution Raman spectrometry equipment to analyze the components of the hexene preparation process.") (emphasis added); page 15, lines 4-6 ("In such cases [with ethylene and 1-hexene], obtaining a calibration model that can distinguish and correct[ly] quantify these components may seem impossible.") (emphasis added); page 18, lines 30-31 ("However, it has been *discovered* that such *high resolution is not required* for the present processes. A *low resolution* Raman spectrometer having lower cost may be

used.”) (emphasis added). Appellant respectfully submits that the Examiner has failed to establish a *prima facie* case of obviousness for the additional reason that there is no motivation to modify Lashier as asserted by the Examiner. Indeed, the only noteworthy motivation to modify the Lashier reference as suggest by the Examiner appears to be in the present application itself, as noted above.

In the Advisory Action mailed December 21, 2005, the Examiner posited that once the “appropriate wavelengths [are] selected, then the equipment having such a selected wave length would be selected to be used.” This statement by the Examiner supports Appellant’s position because the skilled artisan without benefit of the present disclosure would choose a high-resolution Raman for measuring conversion of ethylene to 1-hexene in an ethylene trimerization process (i.e., 1-hexene process) for the reason that the ethylene and 1-hexene peaks are so near to each other. One of ordinary skill in the art would not view the *low-resolution* Raman as appropriate equipment for the measurement of closely space peaks, as found in measuring conversion in a 1-hexene process (i.e. the Lashier process). See Examiner’s Answer, pages 3 and 6 (“According to the inherent properties of each reaction, one having ordinary [sic] skill in the art would select appropriate equipment for the measurement.”). Moreover, such a modification would pose no reasonable expectation of success without the benefit of Appellant’s disclosure. See M.P.E.P. § 2143.02 (citing *In re Merck & Co., Inc.*, 800 F.2d 1091, 231 U.S.P.Q. 375 (Fed. Cir. 1986)).

Impermissible Hindsight

Apparently, the Examiner believes that because Alsmeyer discloses the use of Raman spectroscopy in a polyester process, the Alsmeyer reference can then be paired with any other reference disclosing a different process to render the use of Raman spectroscopy in that different process as obvious. *See* Final Office Action, pages 3-4 (suggesting that use of Raman in Lashier is obvious because “Alsmeyer discloses that the Raman spectrometry has a lots [sic] of advantages for monitoring chemical processes.”). However, Appellant respectfully asserts that the Examiner had no reason to even consider the use of the Alsmeyer on-line Raman in the Lashier 1-hexene process, other than impermissible hindsight based on Appellant’s disclosure. *See, e.g., In re Fine*, 837 F.2d 1071, 5 U.S.P.Q.2d 1596 (Fed. Cir. 1988) (explaining that one cannot use hindsight reconstruction to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention); Final Office Action, page 4; Application, page 4, lines 3-21; page 18, lines 14-34.

Indeed, the Alsmeyer polyester process (a condensation reaction) and the Lashier 1-hexene process (an addition reaction) are disparate processes. To be sure, the demands placed upon the Raman spectrometer in the *Alsmeyer polyester process* are very different than the demands that would be placed upon the Raman spectrometer in the *Lashier 1-hexene process*. In measuring conversion, for example, the Raman application is much easier (and more believable) in Alsmeyer because the Alsmeyer reactants and product

possess *dissimilar* wavelengths. This is in contrast to the similarity of wavelengths of the reactant ethylene and the product 1-hexene of the Lashier process.

Such glaring disparities between the Alsmeyer and Lashier processes clearly impact the ability/configuration of the Raman device in providing “an output signal representative of one or more chemical components of the reaction,” as recited in claim 1, or in “monitoring a trimerization reaction,” as recited in claim 30. Plainly, the Examiner has employed impermissible hindsight, without any teaching or direction except for that of the present disclosure, to justify the combination of Alsmeyer and Lashier.

The Examiner’s vague statement about the generic advantage of Raman in chemical processes is uninformative. *See* Examiner’s Answer, page 3. Further, the specific Alsmeyer passages cited by the Examiner offer no real assistance in employing *low-resolution* Raman in Lashier (or as presently claimed). *See id.* (citing Alsmeyer, col. 1, lines 22-27; col. 2, lines 47-51; col. 3, lines 15-30 and 59-67). These Alsmeyer passages cited by the Examiner merely mention the use of Raman in analytical laboratories to provide information about chemical substances, the problems of sampling chemical processes, the challenges of on-line or in-situ applications, and how Raman spectroscopy can improve upon some traditional methods for monitoring chemical processes. Alsmeyer does *not* teach or suggest that Raman spectroscopy, let alone low resolution Raman spectroscopy, can be utilized in every known chemical process.

The Examiner's reliance on any implication in Alsmeyer of applicability beyond a polyester process to chemical processes, in general, does *not* salvage the Examiner's rejection. *See* Examiner's Answer, page 6. To the contrary, the Alsmeyer and Lashier references are absolutely devoid of any indication of employing Raman (especially *low-resolution* Raman) in a 1-hexene process. Further, Appellant emphasizes the absurdity of any assertion (by either the Examiner or by Alsmeyer et al.) that the Alsmeyer reference teaches or suggests the applicability/employment of all of the differing techniques of Raman spectroscopy in the entire vast array of disparate chemical processes in existence. Alsmeyer does not even mention, much less enable, the large number of differing Raman techniques or the nearly infinite number of possible applications of Raman spectrometry.

The Examiner has failed to bridge the enormous hindsight gap that must be overcome to find motivation to combine Alsmeyer and Lashier, as proposed by the Examiner. Again, the Raman measurements in Alsmeyer are relatively straightforward, especially with the high resolution Raman spectrometer apparently taught by Alsmeyer. Conversely, in Lashier, the key structural feature of the reactant ethylene and product 1-hexene, the carbon-carbon double bond, has similar wavelengths which make them inherently more difficult to differentiate and measure with Raman spectroscopy, *especially* by a low resolution Raman spectrometer, as claimed. *See, e.g.,* Application, page 14, lines 3-33.

Clearly, the Examiner has *not* explained the motivation of why one skilled in the art would specify a *low-resolution* device to monitor the Lashier process, especially in light of the difficulties discussed above. This is not surprising considering there is no motivation. The Federal Circuit has warned that the Examiner must not “fall victim to the insidious effect of a hindsight syndrome wherein that which only the inventor taught is used against its teacher.” *See In re Dembiczak* 50 U.S.P.Q. 2d 52 (Fed. Cir.1999). (quoting *W.L. Gore & Assoc., Inc. v. Garlock, Inc.*, 220 U.S.P.Q. 303, 313 (Fed. Cir.1983)).

Examiner's Answer

In conclusion, Appellant would like to address two of the assertions made in the Examiner's Answer. With regard to the first assertion Appellant will address, the Examiner stated:

[Appellant's arguments are] not persuasive since the peaks of the trimerization to measure to determine conversion are ethylene and 1-hexene at 1620 cm-1 and 1640 cm-1 respectively *are constants which are not invented by applicants but the numbers are characteristics of ethylene and 1-hexene*. These numbers are not variables but constants. Therefore, the components (reactants and products) of these reactions and their peaks must be recognized and known, so that appropriate equipment can be selected to [be] able to measure these peaks.

Examiner's Answer, page 5 (emphasis added).

Appellant fully recognizes that the ethylene and 1-hexene peaks at 1620 cm-1 and 1640 cm-1, respectively, are constants. This fact is not in dispute. What is at issue is that

the closeness of these peaks place constraints upon the selection of the equipment which could be utilized in the Lashier 1-hexene process or in the processes recited in the claims. In general, the closer the wavelengths of two peaks, the higher the resolution of the instrument needed to distinguish and accurately measure the two peaks. Clearly, the relationship between the measured wavelengths (i.e., the peak separation between the characteristic ethylene and 1-hexene) place constraints upon the Raman spectrometer and the resolution needed to distinguish and accurately measure the requisite peaks. Therefore, the resolution of the Raman device is applicable to the patentability analysis. Consequently, the recited limitation directed to utilizing *low-resolution* Raman spectroscopy equipment is real and non-trivial.

Second, the Examiner stated:

The [Appellant's] argument that the Alsmeyer polymerization reactants and product polymer polyester have dissimilar wavelengths and therefore are relatively straightforward to differentiate and measure, especially with the high resolution Raman spectrometer apparently taught by Alsmeyer is not persuasive since (1) Alsmeyer discloses *generally that chemical processes, not limited to any specific reaction, can be monitored by Raman spectrometry equipments . . .* (2) Alsmeyer discloses that *polyester forming process is only a typical polymerization process which can be monitored by a Raman equipment . . .*

Examiner's Answer, page 6 (emphasis added).

The Alsmeyer disclosure does *not* teach or suggest a genus of employing all techniques of Raman spectroscopy in all chemical processes. This is clear in light of the

vastness of such a hypothetical genus, the cursory mention in Alsmeyer to chemical processes, the emphasis in Alsmeyer on a single specific polyester polymerization process, and so on. Further, even if Alsmeyer disclosed and enabled such a vast genus (which Appellant does not concede and which Appellant believes to be practically impossible), that alone would *not* render obvious smaller classes (i.e., a subgenus or species) of Raman applications. *See* M.P.E.P. §§ 2131.02 and 2144.08 (“The fact that a claimed species or subgenus is encompassed by a prior art genus is not sufficient by itself to establish a *prima facie* case of obviousness.”). This is especially true with regard to the use of Raman spectroscopy, as presently claimed. This is also true in general considering the various particularities of Raman spectroscopy and/or individual consideration of the chemical processes, for example. *See id.* In sum, even if Alsmeyer taught the use of *low-resolution* Raman, in general, neither Alsmeyer nor Lashier teach or suggest the ability to use low-resolution Raman spectroscopy in the Lashier 1-hexene process. *See* M.P.E.P. §2144.08.

Request Withdrawal of Rejection

In summary, the Examiner’s rejection is insufficient for at least the reason that the cited combination fails to teach all of the features (e.g., low-resolution Raman) recited in the independent claims. As acknowledged by the Examiner, Lashier fails to disclose the use of Raman spectroscopy, and the Alsmeyer reference (relied upon to teach the use of Raman spectrometry equipment) does *not* disclose the *resolution* of the Raman equipment (or the use of Raman spectroscopy in monitoring an olefin oligomerization

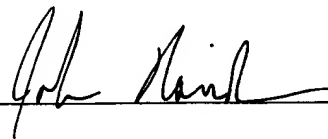
reaction). *See, e.g.*, Office Action Mailed April 11, 2005, page 4. Further, there is no motivation to modify the Lashier system to incorporate use of Raman spectroscopy, much less to incorporate *low-resolution* Raman spectroscopy. Indeed, the Examiner used impermissible hindsight in combining the references as alleged. In view of these deficiencies of the Examiner's rejection, and of the Lashier and Alsmeyer references, Appellant respectfully requests that the Board direct the Examiner withdraw the rejection of claims 1-5, 8-12, 30-33, and 35-37.

Conclusion

Based upon the above points of clarification in conjunction with the arguments made in the previously filed Appeal Brief, Appellant believes that the claims are clearly allowable over the cited art. The Examiner's rejections, therefore, cannot stand. Appellant respectfully requests that the Board withdraw the outstanding rejections and pass the present application to allowance.

Respectfully submitted,

Date: August 14, 2006



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